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Procedure and Device for Manufacturing Crystallizable  
Plastic Material

The invention relates to a procedure for manufacturing crystallizable plastic material, such as polyesters and the like, in particular PET, by having the melting phase be followed by crystallization and solid-state post-condensation phase, as well as to a device for executing the procedure.

Crystallization and solid-state post-condensation (SSP) of polyesters obtained from a melt, in particular PET (polyethylene terephthalate), is generally known). In this case, the meltable polyester (melting point 270 °C and above) is processed into cylindrical pellets while simultaneously cooled down to room temperature, and serves as an amorphous parent material for subsequent crystallization and post-condensation to PET. According to EP-A-379684, crystallization takes place in two fluidized beds (combination of solids-air bed and boiling bed) at temperatures of 140 °C to 180 °C. Crystallization is followed by exposure to impact to dissolve agglomerates.

However, crystallizing at a temperature of less than 140 °C already and also executing solid-state post-condensation at a temperature exceeding 180 °C is also known (e.g., according to CH 02131/92-2, which was not published as prior art).

EP-A-822214 describes a procedure in which polyester material is extruded, pelleted and crystallized without cooling the melt to a temperature far below the crystallization point. In this case, a temperature of

... a conventional SSP process for 24 hours at approx. 205 °C. According to the instruction of US-A-5510454, the temperature of the plate onto which the drops fall can also measure 180 °C.

Also known is a procedure for the simultaneous drying and crystallization of thermoplastics, e.g., PET according to WO94/25239, wherein plastic filaments to be dried are quenched for at most 1.5 seconds to achieve a surface temperature of at least 100 °C. As a result of this only partial cooling of the plastic, the crystallization period is to measure at most 20 seconds.

In a device for manufacturing polyamides according to DE-A-19510698, a moving-bed reactor can be evacuated, wherein an evacuation pump can be provided with a separator for separating dust out of the waste gas. However, solid foreign substances, dusts and the like are not reliably removed from the plastic material.

US-3405098 describes a procedure for preparing linear condensation polyesters for solid phase polymerization, wherein the melt is quickly quenched in order to obtain an essentially amorphous, solid polyester, which is subsequently heated to 150 °C to 200 °C again, in order to obtain a partially crystallized polyester, which is subsequently milled into fine particles, and classified using sieves. The polyester prepared in this way is then subjected to solid-phase polymerization in a fluidized bed.

The object of the invention is to further develop a procedure for manufacturing crystallizable plastic material, like polyester or PET, in such a way as to achieve a higher reactivity in the SSP process as the result of larger crystals and an improved surface

crystal structure, and to reliably separate solid foreign substances from the plastic material after crystallization. Power consumption is to be reduced as well. This is done based on the features in claims 1 or 3.

The object of the invention is also to provide a suitable device for executing the above procedure.

The subclaims contain preferred embodiments.

The invention shall be described in greater detail below in an embodiment based on a drawing. The sole figure in the drawing shows an elementary diagram.

PET 1 passes from a melting reactor (not shown) into a cutter 2 with a temperature of approx. 280 °C while being cooled and solidified.

The amorphous pellets 3 with a temperature of 140 °C to 180 °C produced in this way then pass to a fluidized bed 4 without any further cooling for a retention time typical for the procedure, and then to a sieve 5, which can also have a downstream ambient air sifter to separate out dust and other foreign solids.

According to EP-A-379684, the fluidized bed 2 can also resemble a combination of spouted bed and boiling bed. If needed, additional crystallization can follow the sieving process (not shown).

The PET cleaned and crystallized in this way passes in the usual manner into a preheater 6, or directly into a shaft reactor 7, where the solid phase recondensation into PET takes place, and only thereafter is the granulate cooled to room temperature in a cooler 8.